ABSTRACT

This research shows the influence of artificial lighting in the museums on the viewers' emotion through an innovation thinking method and puts forward a new lighting evaluation standard. Through evaluating the visitors' response index, the process of lighting design can be more humanized and induce more desirable emotional feedback. This study is an interdisciplinary research on basic theories and methods involving several subject areas. It covers the fields of architecture, design, optical engineering and psychology, which put forward the relationship among museums, people and the illuminated environment. Through theoretical derivations and experiment evaluations, it aims to create a comfortable lighting environment in museums.

Through the investigation on art museums, this study finds out their characteristics and the existing problems. On this basis, it proposes a lighting design evaluation model of SVOE, which includes four parts, i.e. Spatial, Visual, Optical and Emotional. It also optimizes the evaluation index of environment lighting. Combining the SVOE model, it uses computer software to conduct simulation experiments, and evaluates the subjects via eye movement tracking indicators.

This study uses three methods, which are computer simulation, laboratory simulation and museum field research. Firstly, it simulates the lighting of an art museum and studies the subjective emotions of the visitors while they appreciating the paintings. Two lighting parameters of color temperature and illuminance are compared and analyzed. Secondly, based on the study of visitors' emotion under the lighting of Japanese art museums, it analyzes the emotional response of the visitors in three different illuminated environments. Thirdly, it combines subjective questionnaires with objective evaluation methodology, and the actual evaluation is carried out with the aid of eye movement tracking equipment to study which illuminated environment parameters get the most visitors' attention.

Based on the lighting quality and comfort model established in this thesis, the experiment of emotional response and thinking comprehension under artificial lighting are designed and verified respectively. In the experiment, the parameters of visual comfort and quality of the lighting are obtained through the psychological evaluation of the visitors' appreciation of artworks in the museum. The relationship between the validity and applicability of the evaluation model is demonstrated. In the experiments of understanding and thinking, the visual comfort under various lighting conditions in different scenarios is evaluated and used for the verification of two evaluation models of visual comfort respectively. The parameters are obtained via eye movement tracking equipment. Through comparing theses subjective and physiological indexes, an emotional response index is confirmed. Finally, this study establishes the evaluation methodology of the influence of artificial lighting on visitors' emotion in the museums.

Keywords: Evaluation methodology; Psychophysical experiments; Emotional response; Lighting design; Environment lighting.